CLAIMS

1. An optical apparatus comprising a frequency stabilised linear HeNe gas laser having an Ne content of an Ne^{20} isotope and an Ne^{22} isotope in substantially equal proportions, the apparatus in use having optical feedback toward the laser causing, at least 0.1% of the light output of the laser to be returned toward the laser.

2. An optical apparatus as claimed in claim 1 wherein the apparatus comprises one of:

an interferometric displacement determination device;

a polarisation measurement device;

spectroscopic analysis apparatus; or

a heterodyne frequency measurement device.

3. An interferometric displacement determination device comprising a frequency stabilised linear HeNe gas laser having an Ne content of an Ne^{20} isotope and an Ne^{22} isotope in substantially equal proportions, the apparatus in use having optical feedback toward the laser causing, at least at intervals, at least 0.1% of the light output of the laser to be returned toward the laser, the device being any one of a single beam, a plane mirror, a long range, or an optical fibre type.

4. An interferometric displacement determination device as claimed in claim 3 wherein the Ne^{20} and Ne^{22} isotope content is in the ratio of about 60:40 to about 40:60 respectively.

5. An interferometric displacement determination

device as claimed in claim 3 or claim 4 wherein the HeNe gas ratio is about 80:20 to about 90:10 respectively.

6. An optical apparatus or interferometric displacement determination device as claimed in any one of the preceding claims wherein the laser achieves a frequency stabilisation below $1x10^{-7}$ (Frequency noise/Absolute frequency) and the optical feedback is in the range of 0.1% to 10% of the light output of the laser.

7. An optical apparatus or interferometric displacement determination device as claimed in any one of the preceding claims wherein the apparatus or the device includes an optical fibre element.

8. An optical apparatus or interferometric displacement determination device as claimed in claim 6 wherein the method of frequency stabilisation employed is modal control.

9. An optical apparatus or interferometric displacement determination device as claimed in claim 7 wherein the modal control is control of the ratio of the intensities of two laser modes.